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Poultry Rations

By
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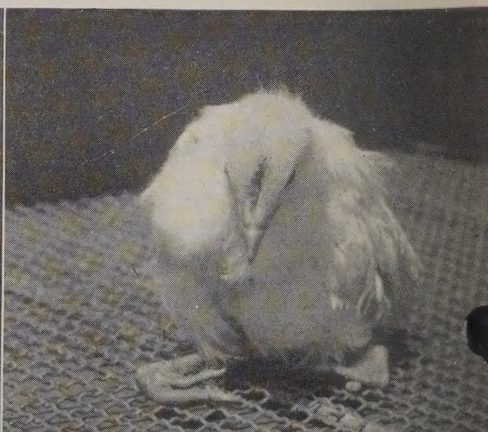
Vitamin A Deficiency. Typical symptoms:— watery eyes, unsteady gait, ruffled feathers, poor growth, and pale shanks. Post-mortem shows kidneys and ureters congested with urates.

Rickets or "leg weakness" due to vitamin D deficiency. Chick is unable to stand or walk normally. Bones are soft and abnormally low in ash.

Perosis or slipped tendons. Enlarged hocks, twisted shanks, and bowed legs are typical symptoms. A result of too much bone meal (phosphorus); also due to a deficiency of manganese.

"Curly toe" paralysis. Caused by a lack of vitamin G. Slow growth and ruffled feathers are also symptoms. Dried milk, dried whey, and alfalfa are common sources of this vitamin.



Poultry Rations

By

C. E. Lampman, Pren Moore, J. K. Williams, and D. W. Bolin*

Essential Features for Mixing Poultry Rations

THREE essential features are necessary for satisfactory rations: (1) The ration should be well balanced in the protein, vitamin, and mineral supplements; (2) A proven formula should be used; none of the ingredients should be overlooked; and (3) Thorough mixing, so that all ingredients will be uniformly distributed, is necessary. Shovel mixing may be as efficient as mechanical mixing when thoroughly done. Power mixers are now available at reasonable costs. The necessary facilities consist of a proven formula, the necessary ingredients, and scales.

The test of a good *laying* ration is its ability to promote efficient egg production and maintain body weight, health, and vitality of stock. The test of a good *growing* ration is its ability to produce vigorous, rugged, well-fleshed pullets.

Necessary Requirements for Balanced Rations

Proteins

Proteins from animal sources are necessary because they are more efficiently assimilated than the plant protein. Insufficient animal protein results in poor growth in young stock and a reduction in number, size, and hatchability of eggs produced. Recent trials at the Idaho Agricultural Experiment Station have shown that a lack of animal protein will reduce the size of eggs by as much as 2 ounces per dozen.

Common animal protein supplements include meat and fish meals and dried milk. The amounts of these various ingredients are indicated in the suggested formulas. A combination of the three supplements is desirable although good results can be obtained with simplified combinations such as 17 per cent meat meal and 5 per cent dried milk. Soy bean oil meal may be used to replace from one-fourth to one-third of the animal proteins.

The protein content of mashes varies with (1) the kind and age of poultry concerned; (2) the proportion of mash to scratch; and (3) whether liquid skim milk is used as a supplementary feed. The per cent protein of various mashes recommended when *no* liquid skim milk is used is as follows:

Laying hens 20	Chick starter 18.5	Turkey starter 24
Breeding hens 20	Pullet developer 17.0	Turkey growing 20

Liquid skim milk furnishes the most digestible protein and, when fed as the sole drink (approximately 5 gallons per 100 hens daily), will promote efficient egg production without the addition of other animal protein feeds.

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If ground peas comprise 20 per cent or more of the mash, 3 gallons per 100 hens daily is sufficient. The use of skim milk in conjunction with chick starting rations is discussed on page 13.

Vitamins

Vitamin A—There are at least three important facts about this vitamin: (1) It promotes growth; (2) It functions as an anti-infectious vitamin in that it helps to protect the bird from such infections as cold and roup; and (3) It is naturally unstable. True vitamin A is found only in the fish oils, so far as poultry feed stuffs are concerned. The chicken has the ability to synthesize its own vitamin A from the carotene contained in the green leaves of alfalfa, clover, grasses, and other green forage crops. Carotene is unstable as indicated on page 7 in the discussion of alfalfa.

A lack of this vitamin results in poor growth and reduced vitality. The proventriculous, kidneys, and ureters are enlarged and congested. In extreme cases the kidneys are covered with a white network caused by an accumulation of urates, and the ureters are filled with this same material. Some birds develop eye lesions and, in extreme cases, the throat is covered with tiny abscesses or "pustules" (see Fig. 1). This condition is commonly known as nutritional roup and is often complicated with contagious roup (see Idaho Ext. Bull. 119, *Prevention and Control of Poultry Diseases.*)

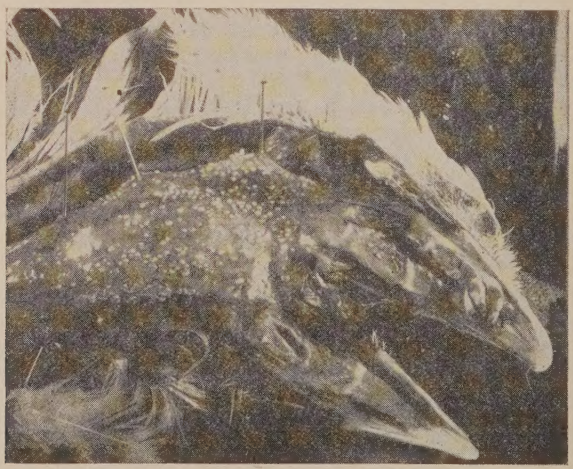

Figure 1. Typical vitamin A deficiency throat lesions. Mucous membrane of throat and oesophegus show extreme pustules.

The principal vitamin A supplements include the green leafy portions of growing plants, alfalfa hay leaves or meal of good quality, cod liver oil, and yellow corn. Inasmuch as alfalfa is produced abundantly in Idaho, it should be freely incorporated in poultry rations as an economical vitamin A supplement (see page 7).

Fresh cod liver oil is the most potent source of true vitamin A. It loses its potency upon exposure to the air; therefore, to realize its full value as a source of "A" it should be mixed in the ration frequently. A good practice is to mix supplementary oil in the scratch feed when additional vitamin A is needed.

Vitamin D—This vitamin influences mineral assimilation by functioning as an activating agency in the utilization of calcium and phosphorus. It is to be considered as a substitute for the ultra-violet rays of direct sunshine. The need for adequate quantities of this vitamin, then, increases as the birds are deprived of natural sunshine.

Adequate vitamin D (1) prevents rickets (leg weakness in baby chicks and crooked keels in young and laying stock); (2) promotes normal bone formation; (3) improves the strength and thickness of egg shell; (4) promotes normal hatchability of eggs; and (5) improves the quality of chicks.

Cod liver oil is the most common source of vitamin D (for amounts recommended see page 9). These recommended amounts may need to be increased temporarily during winter months if egg shells become thin and weak, if birds are in confinement continuously, or if they are kept in laying cages. Laying hens in confinement require more vitamin D than growing chicks. Growing turkeys and breeding hens have the highest requirements.

Vitamin G—The vitamin G complex has two essential nutritional factors—riboflavin and the filtrate. Vitamin G functions in poultry nutrition by promoting normal growth and hatchability. It is, therefore, important to have *starting* and *breeding* rations adequately supplied with this vitamin.

Lack of vitamin G results in a characteristic "curly-toe" paralysis, slow growth, and ruffled feathers in young chicks. In poults the deficiency results in incrustations (scab-like sores) at the corners of the mouth and eyelids. The latter may become thickened and tend to stick together. The bottoms of the feet become sore, caused by a roughening of the skin and cracks at the joints. A lack of this vitamin in the breeder's ration reduces the hatchability of eggs and a deficient condition in chicks and poults hatched.

Fresh succulent green feed, dried liver, dried whey, and dried milk are sources rich in this vitamin. Dehydrated alfalfa is the next in importance, followed by sun-cured hay of good quality and fish meals.

Minerals

The mineral requirements consist largely of adequate supplies of calcium and phosphorus in proper amounts and in proper ratio to each other (approximately 2 of calcium to 1 of phosphorus). Laying hens require extra calcium in the form of calcium carbonate for shell formation. The grains are deficient in calcium so that the proper level of this mineral in the mash is supplied by adding oyster shell (chick size).

A high grade limestone occurs in numerous deposits designated by different terms, according to the formation; the more common being calcite and aragonite. Tests conducted at the Idaho Station show that laying hens

prefer oyster shell when given their choice; however, a high grade calcite has given satisfactory results.

The phosphorus requirements appear to be adequately met by the bone meal contained in the meat and fish meals (particularly the former), when used at the recommended levels. The need for adding bone meal as such to the mash mixture, therefore, depends upon the amount of meat meal used and its content of bone.

Perosis

An excess of phosphorus can be very harmful in all-mash starting rations for either chicks or poults. Too much phosphorus aggravates a nutritional condition known as perosis or slipped tendons which results in enlarged hocks. This same condition is also caused by a deficiency of manganese in the ration (see inside front cover page).

Perosis may be prevented by having a proper amount of phosphorus in relation to calcium and an adequate amount of manganese. Bran, shorts, and middlings are high in manganese compared with the grains. Results at the Idaho Station thus far have demonstrated that when bran and shorts are used in mash mixtures according to the recommended formulas no trouble from perosis will be experienced. Inasmuch as perosis develops to a greater extent with young birds in batteries, it may be desirable to add manganese in the form of manganese sulphate to a battery mash at the rate of ¼ pound manganese sulphate per ton of mash. As a margin of safety it may be added at the same rate to the breeder mash.

Although numerous other minerals, such as iodine and iron, are required to promote normal nutrition, they are present in sufficient amounts in normal feed stuffs so that additions from other sources are not necessary. Iodine is supplied in the fish meal and oyster shell.

Direct Sunshine

The ultra-violet rays of direct sunlight play an important part in nutrition as an aid in mineral assimilation. The ultra-violet rays function as an activating agency in the assimilation of calcium. Ordinary window glass filters out the ultra-violet rays; therefore, the direct sunshine should be admitted inside the house to the greatest possible extent during winter months. Sunshine is most potent in these beneficial rays during the middle of the day. Some poultrymen use wire-bottomed sunyards to obtain greater benefits from sunshine.

Home-Grown Feeds

Wheat is an excellent feed for poultry and is generally available in Idaho. It constitutes the largest portion of the scratch mixture, and in many cases, is the only grain used. A limiting factor in the use of wheat is its deficiency in vitamin A.

Oats and Barley add fattening properties to the mixture. *Experiments at several stations have shown less cannibalism and better feathering of birds as a result of the use of oats in the ration.* Feeding trials at the

Idaho station have demonstrated that either of these grains alone or in combination may comprise as much as 30 per cent of the mash. The quality of these grains, particularly the oats, will necessarily govern the amounts used. These grains are also deficient in vitamin A.

Yellow Corn has often been classified as the one best single grain. In addition to the valuable properties of the small grains, it is valuable as a vitamin A supplement.

Ground peas used from 20 to 30 per cent of the laying mash have given excellent results. Feeding trials at the Idaho Station have demonstrated that peas of good quality are about equal to yellow corn as a vitamin A supplement. When ground peas are used in the above amounts the meat and fish meals should be reduced to 5 per cent of each. If liquid skim milk is available at the rate of 3 gallons per 100 hens daily, the meat and fish meals may be omitted.

Alfalfa, in addition to meeting the requirements of poultry for vitamins A and G, is also a source of vitamin K. It is the carotene in alfalfa that the bird utilizes to manufacture its own vitamin A; therefore, its value as a vitamin A supplement is based upon its carotene content.

The carotene content of any cured alfalfa product varies markedly. This variation is due largely to the nature of carotene itself. It is easily destroyed in the presence of sunlight and by high temperatures. A large percentage of the carotene is lost in the common practices of curing hay. It is impossible to preserve all the carotene originally found in green growing alfalfa but the following suggestion may help to produce a better quality hay with respect to its carotene content: (1) Cure the hay as quickly as possible and with the least possible exposure to direct sunlight; (2) the leaves contain most of the carotene; conserve them to the greatest

APPROXIMATE COMPOSITION OF FEEDS

	Protein	Fat	Fiber	Ash	Calcium	Phosphorus
Grains						
Wheat	12.0	1.8	2.7	2.0	0.04	0.40
Wheat (Palouse soft)	10.0	2.0				
Bran (average)	15.5	4.9	9.2	6.2	0.12	1.25
Bran (white wheat)	14.0					
Barley	10.5	2.0	6.0	2.7	0.05	0.38
Oats	12.0	4.5	11.0	3.6	0.08	0.35
Oat groats	16.0	6.0	2.0	2.0	0.08	0.42
Corn	10.0	3.7	2.3	1.4	0.01	0.28
Middlings	17.0	4.4	5.0	4.4	0.09	0.70
Shorts	16.0	4.7	6.0	4.4	0.07	0.90
Shorts (white wheat)	15.0					
Peas	23.0	1.5	8.8			
Concentrates						
Fish	70.0	7.0	1.6	14.0	3.80	2.50
Meat meal	55.0	10.0	3.0	24.0	8.50	4.20
Milk (dried skim)	34.0	0.9	——	8.0	1.24	1.00
Dried whey	12.5	0.7	——	9.7	1.20	0.70
Soy beans	44.0	5.6	6.0	6.0	0.28	0.66
Bone meal (steamed)	7.1	3.3	1.0	81.3	32.60	15.00
Bone meal (raw)	25.0	2.5	1.0	60.0	29.00	14.00
Alfalfa (leafy)	18.0	2.5	25.0	8.5	1.60	0.18
Alfalfa (dehydrated)	20.0	2.8	18.0	10.0	2.00	0.25
Oyster shell	——	——	——	60.0	38.00	0.50
Cod liver oil (U.S.P.)	——	98.0	——	——	——	——

extent possible; and (3) use leafy third-crop hay for winter rations because by then most of the hot weather is over; therefore, less carotene is lost in curing and during storage.

Work at the Idaho Station has shown that the better grades of sun-cured alfalfa have analyzed as high as 10 to 12 units (mgs. of carotene per 100 gram sample), while ordinary sun-cured hay will average only 3 to 5 units. Dehydrated (artificially dried) alfalfa leaf meal usually contains more units of carotene than sun-cured.

Alfalfa hay leaves should be kept available in wall feeders, especially when birds are receiving rations largely composed of the white grains.

Supplementary Feeds

A well-balanced ration contains certain supplementary feeds such as meat meal, fish meal, dried milk, dried whey, soy bean oil meal, cod liver oil, salt, oyster shell or calcite, and bone meal.

Meat meal should be of high quality. The method of preparation, the *absence of dried blood and fiber,* and a *minimum amount of bone* are factors in the manufacture that makes for a high quality protein supplement (see table of Approximate Compositions of Feeds for analysis).

Fish meal is available from several types of fish, including herring, sardine, and salmon. All the fish meals run higher in protein than meat meals. Herring meal, which is the most commonly used, contains approximately 70 per cent protein, while the other meals average about 65 per cent.

Dried milk is a common ingredient in poultry mashes, especially in those for starting chicks and breeding hens. Recent investigations have proved the value of dried milk to be partly due to vitamin G (a growth-promoting vitamin) as well as its protein content. It functions as an efficient laxative when used in mashes from 20 to 25 per cent.

Dried whey has recently become an important ingredient as a vitamin G supplement. It contains about one and one-half times as much as dried milk. It is more commonly used in starting mashes for chicks and poults and in rations for breeding hens.

Soy bean oil meal is one of the legmue protein concentrates which contain certain amino acids that blend in well with the animal protein supplements. It can be used to replace from one-fourth to one-third of the meat and fish meals. It is not a necessary ingredient, however, and need not be considered in simplified formulas.

Cod liver oil is the most common fish oil used as a vitamin D supplement, although other oils such as sardine are used to some extent. Cod liver oil is also rich in true vitamin A (see pages 4 and 5). Most oils are biologically tested with the *units of vitamins A and D stamped on the container.* Such grades should be insisted upon.

Two types of cod liver oil are generally available, the natural U.S.P. oil with a *minimum* of 85 vitamin D units and 600 vitamin A units (some oils may run higher), and the concentrate (approximately 5 times as potent as the natural grade) containing a *minimum* of 400 vitamin D units and 3000 A units.

The amount of cod liver oil to be used depends upon (1) the concentration of the oil; (2) the proportion of mash to scratch; (3) whether the birds are confined indoors continuously; (4) whether the cod liver oil is relied upon as a source of vitamin A as well as D; (5) the kind and age of poultry concerned; and (6) the rate of egg production. As a general rule, for laying hens in confinement consuming approximately equal parts of mash and scratch, the recommended level is 2 per cent of the natural or one-half of 1 per cent of the concentrate in the mash. The natural oil may be used on the scratch mixture providing the grain is fed in troughs.

Oyster shell is used in the mashes to increase the calcium content. It should be constantly available in hoppers. A further discussion of mineral requirements will be found on page 5.

Salt

(See page 11).

Grit

A hard insoluble grit, such as granite or mica, should be available in hoppers at all times. Grit seems to promote a more efficient utilization of feed, and some experimental evidence indicates that it helps to prevent abnormalities in the gizzard lining.

Rations

A ration, so termed, consists of all the feed which a flock receives. It includes the mash and scratch mixtures and such additional feeds as alfalfa, cod liver oil, skim milk, oyster shell, bone meal, and any other feeds that may be provided. *The mash receives greater attention because of the importance of the protein, mineral, and vitamin supplements incorporated.* The formulas listed have been used with satisfactory results and are based upon newer available information. The proportions of ground grains and mill by-products may be varied within limits to suit local conditions. *It is extremely important to keep the protein, vitamin, and mineral supplements in balance.*

The quality of the mash can be no better than the quality of the ingredients used. A chemical analysis is of little value in determining the quality of such ingredients as the alfalfa leaf meal, meat and fish meals, or cod liver oil. A consistent program of mixing and feeding is necessary with whatever formula is decided upon.

Formula No. 1 is a standard type of laying mash, utilizing oats and barley to a liberal extent. An attempt has been made to keep it as simplified as possible and still a well-balanced mixture.

Formula No. 2 is a slight modification of No. 1 with dried whey and soy bean oil meal incorporated.

It is to be emphasized that the oats and barley, particularly the oats, should be of good quality. Wheat shorts may be used in either of these formulas to the extent of 10 per cent, making slight reductions in the bran, oats, and barley, to compensate for the addition of shorts.

SUGGESTED LAYING MASHES

(Based on 100 Pounds)

Ingredient	Laying Mashes			Breeder Mash
	No. 1	No. 2	No. 3	No. 5
Bran	30.0	30.0	25.0	24.0
Ground oats	15.0	14.0	15.0	10.0
Ground barley	15.0	14.0	12.0	10.0
Ground corn	10.0	10.0	10.0	20.0
Ground peas	—	—	25.0	—
Alfalfa leaf meal	7.0	7.0	7.0	10.0
Meat meal	7.0	7.0	—	7.0
Fish meal	7.0	6.0	—	7.0
Soybean oil meal	—	3.0	—	—
Dried milk	5.0	2.5		4.0
Dried whey	—	2.5		4.0
Oyster shell	3.0	3.0	3.0	3.0
Bone (granulated)	—	—	2.0	—
Salt	1.0	1.0	1.0	1.0
Cod liver oil (natural)	2.0	2.0	2.0	2.5
or				
Cod liver oil (concentrate)	0.5	0.5	0.5	0.6
Approximate Composition (in per cent)				
Protein	20.80	20.7		20.58
Fat	6.20	6.2		7.01
Fiber	7.10	7.2		6.49
Ash	9.50	9.5		9.50
Calcium	2.25	2.3		2.30
Phosphorus	1.00	1.0		1.00

No. 3 is to be supplemented with 3 gallons skim milk daily per 100 hens.

Fat content is based upon natural oil; if the concentrate is used the fat content will be reduced accordingly.

The vitamin A units depend upon the amount and quality of alfalfa and cod liver oil and the deterioration after mixing.

7 per cent high grade dehydrated (15 mgs. carotene) supplies approximately 1,750 U S P vitamin A units per 100 grams of mash. 7 per cent of high grade sun-cured (8 to 10 mgs. carotene) supplies approximately 1,000 vitamin A units per 100 grams of mash. 2 per cent natural cod liver oil supplies approximately 1,200 vitamin A units per 100 grams of mash. 0.5 per cent cod liver oil concentrate (3000 A) supplies approximately 1,500 vitamin A units.

The vitamin D units depend upon the amount and quality of cod liver oil. 2 per cent USP natural cod liver oil supplies approximately 170 vitamin D units per 100 grams of mash. 0.5 per cent cod liver oil concentrate supplies approximately 200 units of vitamin D per 100 grams of mash. Multiply number of units per 100 grams by 4.5 to obtain number of units per pound.

1 pint of cod liver oil is approximately 1 pound.
2 per cent cod liver oil equals 40 pounds per ton.
0.5 per cent cod liver oil equals 10 pounds per ton.
0.6 per cent cod liver oil equals 12 pounds per ton.

White Grain Rations — Recent feeding trials at the Idaho Agricultural Experiment Station have given satisfactory results with cornless or "white grain" rations where the vitamin A requirements are met by additional amounts of good alfalfa and cod liver oil. For a "cornless" mash modify No. 1 as follows: replace the corn with shorts, use a high quality alfalfa leaf meal at 10 per cent, and reduce the bran to 27 per cent. Feed alfalfa leaves of good quality in wall feeders.

Mash No. 3 is a mixture in which the combination of ground peas and liquid skim milk is utilized. The milk is given at the rate of 3 gallons per 100 hens daily.

Mash No. 5 is designed for breeding hens. It is essentially a laying mash with amounts of vitamins A, D, and G increased by using more alfalfa and cod liver oil and adding dried whey (see page 12 on Care of Breeding Stock).

Suitable Ingredients for the Mash

The mash should be kept as simple as possible and still be balanced with respect to the proteins, minerals, and vitamins. As a general rule the farmer will need to hold to a more simplified mixture than the local miller or feed dealer. There are numerous highly advertised specially prepared ingredients or blends of concentrates and mineral mixtures for sale. *The results available from numerous experiment stations indicate that these are not necessary.*

The bran should be flaky and, preferably, not reground. It is not advisable to substitute the ground grains entirely for bran. As a general rule the bran may be used from 20 to 30 per cent.

Wheat, peas, and corn should be coarsely ground: enough to have a granular or gritty texture.

Oats and barley should be finely ground.

The supplementary ingredients such as meat meal, fish meal, cod liver oil, and other materials have been previously discussed (see page 8).

Salt is one ingredient that is frequently omitted in farm mixtures. It plays an important part in the nutrition of the chicken not only with respect to the mineral standpoint but to the palatability as well.

Scratch Grain Mixtures

The composition of the scratch mixture will depend upon the availability and price of the various grains in different localities. In Idaho, wheat is the principal grain. Yellow corn should be used when the price will permit. Oats and barley (whole, if good quality; otherwise steam rolled) may be used to advantage up to 25 or 30 per cent of the mixture. Either of the following two formulas may be used as a guide:

	No. 1	No. 2
Whole wheat	50	75
Cracked corn	25	—
Oats	15	15
Barley	10	10

The careful feeder will so regulate the mash and scratch that the combined effects will result in the egg production desired and still maintain the proper weight of the birds. The proportion of mash to scratch will vary according to conditions. It should be remembered that the pullet, in addition to giving a satisfactory egg production, must increase her body weight from October 1 to March 1. It is necessary to feed liberally of scratch grain during these months. In late spring and summer the amount of scratch, in relation to mash, will be less.

The consumption of mash is controlled by the amount of scratch given in the morning feed. A heavy feed of grain will reduce the amount of mash consumed while a light feed of grain will encourage greater consumption of mash. Many poultrymen eliminate the morning feed of scratch grain during the summer. The average relationship throughout the year should be approximately a ratio of about 45 per cent of mash to 55 per cent of scratch.

Feed consumption varies according to the size of bird, rate of egg production, and the breed concerned. The following figures may help as a guide: A Leghorn hen weighing 4½ pounds will consume from 7 to 7½ pounds of feed per month. One hundred hens of this weight will consume from 23 to 27 pounds of feed per day, depending upon factors previously mentioned.

Sufficient mash hopper space is essential in order to obtain proper consumption; the general rule is 1 foot of space to every 5 hens.

When birds are given both milk and water to drink, the milk should be given alone until it is consumed. The proportion of mash to scratch is not so essential when milk is given as a supplementary protein.

Any change in the ration should be made gradually. This is especially important when pullets are being shifted from the developing mash to the laying ration.

Pullets should be allowed to come into production gradually. Excessive laying during the first few weeks makes it difficult for the pullet to maintain body weight and often results in a winter molt or it may cause prolapsus, which leads to cannibalism.

Artificial lighting should be used with moderation. A 12- to 13-hour day is sufficient for the average well-bred flock. Excessive lighting does not permit the birds to maintain a normal condition of health.

Feeding and Care of Breeding Stock

During the period of heavy production laying hens become depleted in their reserve of various nutritional factors, particularly the vitamins. The feeding program for breeding hens should be for the following specific purposes: (1) To establish a reserve of vitamins A, D, and G, and other essential nutritional factors; (2) To promote restoration of body weight and yellow pigment; and (3) To improve physical condition, vitality, and ruggedness. It is essential that hens be in prime condition of health to produce hatchable eggs and high quality chicks.

During early fall, production should be terminated so that the birds may have an opportunity to rest and recuperate. The birds may be thrown out of production by reducing the protein level of the ration (usually taking away the mash entirely for several days) and restricting the supply of drinking water. No water is given during the forenoon. Additional containers should be provided when water is given as the birds will be extremely thirsty. This is the time to move them to the winter quarters and to give a worm treatment should it be needed. Any change from the previous routine will be helpful in stopping egg production. After the hens have quit laying and started to molt they should be put back on a good ration that will build body weight and vitality. They should not be forced back into heavy production too soon. It is particularly essential that this ration be well supplemented with the vitamins (see formula No. 5, page 10).

Chick Feeding

The same basic supplements previously mentioned in connection with laying rations are equally important for a well-balanced chick ration. These requirements become of greater importance when chicks are brooded in confinement.

SUGGESTED CHICK MASHES

(Formulas based upon 100 pounds)

Ingredient	Starter		Developer	Fattening
	No. 7	No. 8	No. 13	No. 15
Bran	16	18	20	—
Ground oats	15	12	15	30
Ground yellow corn	25	25	20	30
Ground wheat	10	9	7	—
Ground barley	9	—	8	—
Shorts	10	10	8	30
Alfalfa leaf meal	7	7	5	—
Meat meal	—	5	4	5
Fish meal	—	5	4	—
Dried milk	—	5	4	5
Oyster shell	4	3	3	—
Bone meal	3	—	1	—
Salt	1	1	1	0.5
Cod liver oil (natural)	2	2	1	—
or				
Cod liver oil (concentrate)	0.4	0.4	0.25	—
Approximate Composition				
Protein		18.50	17.20	
Fiber		5.80	6.20	
Ash		8.00	8.50	
Calcium		2.00	2.12	
Phosphorus		.85	.96	

No. 7 is used with liquid skim milk as a drink.

Mash No. 7 is recommended when liquid skim milk is available for supplementary protein. The milk is given as the only drink for the first 2 to 3 weeks and as a part of the drink from then on. Approximately 3 gallons of skim milk daily per hundred chicks, after they are 3 weeks of age, should supply sufficient protein. Give the milk in the morning and after it is consumed provide fresh clean water. The actual amount of milk given will necessarily be regulated by the rate of growth and maturity of pullets.

Mash No. 8 is a formula with the animal proteins incorporated and liquid milk should therefore not be given.

Mash No. 13, referred to as a developing mash, is lower in protein. The chicks should be shifted to the developing mash when they are from 6 to 8 weeks of age.

Oats and barley should always be of good quality and finely ground. If good quality oats are not available, then one-half of the amount specified should be supplied as ground oat groats or ground hulless oats.

Dried whey may be used to replace the dried milk to the extent of 2½ to 3 per cent of either starting or developing mashes.

The levels of ground corn specified should be considered the minimum. When the price of corn is reasonable in relation to other grains, it is good practice to include more in the starting mash.

Ground peas may be used in these mashes at the rate of 10 to 15 per cent.

A scratch mixture should be fed when the chicks are approximately two weeks old. The proportion of scratch should be gradually increased until they are consuming about half and half by the time they are 10 to 12 weeks of age. When the pullets are on range they may be given both scratch and mash available in self feeders.

A Leghorn chick 12 weeks of age will have consumed approximately 8 pounds of feed; a pullet, 5½ months old, approximately 25 pounds.

Feeding to Prevent Cannibalism

Cannibalism usually begins accidentally, after which it develops into a vicious habit. Although the prevention of cannibalism may be chiefly a management problem, some feeding practices will help. Variety in the ration, such as frequent feeding of poultry greens, helps to prevent it, especially among chicks. Fiber in the ration, as provided by oat hulls, is beneficial in preventing cannibalism (see discussion of oats, page 6). Poultrymen are generally including more oats in the ration. It is quite a common practice to provide a separate hopper with whole oats for growing pullets on range and for laying hens. When cannibalism occurs some poultrymen obtain results by feeding meat meal temporarily in separate hoppers in addition to their regular ration.

Feeding Turkeys

Poults increase their body weight more rapidly than growing chicks and, as a result, have higher requirements for protein and vitamins. The following formulas constitute the most recently developed rations based upon experimental work conducted at the Idaho Station, supplemented with work from other sources. It is a good practice to feed the poults finely cut alfalfa or clover in the amounts that they will consume in addition to the regular ration.

Starter mashes should contain oats of good quality for the same reason as discussed under chick rations. The starting mash may be fed from 6 to 8 weeks before any considerable amount of grain is added.

The developing mash should be substituted when birds are from 8 to 10 weeks old.

Both grain and mash may be fed continuously, being available in hoppers during the summer and fall periods. This practice will result in a gradual increase in grain consumption.

Mash formula No. 5 for breeding hens can serve as the basis of a mash for turkey breeding hens. It may be desirable to add more bulk by using more bran and alfalfa.

The reduction of the meat meal results in a slight decrease of the phosphorus content.

Chopped succulent green feed, as suggested in Idaho Extension Bulletin No. 94, will improve any good ration.

Cod liver oil should be discontinued from 2 to 4 weeks before birds are marketed to avoid a "fishy flavor."

See Idaho Extension Bulletin No. 94, *Turkey Growing in Idaho,* for further details on methods of feeding, brooding, and management.

SUGGESTED TURKEY MASHES

(*Formulas based on* 100 *pounds*)

Ingredient	Starter	Developer
Bran	18.0	20.0
Ground oats	10.0	10.0
Ground corn	20.0	20.0
Ground barley	6.5	11.0
Shorts	10.0	10.0
Alfalfa leaf meal	7.5	7.0
Meat meal	10.0	8.0
Fish meal	10.0	5.0
Dried milk	5.0	5.0
Oyster shell	2.0	3.0
Salt	1.0	1.0
Cod liver oil (natural)	2.5	1.0
or		
Cod liver oil (concentrate)	0.6	
Approximate Composition		
Protein	24.00	20.0
Fiber	6.20	6.5
Ash	9.50	9.4
Calcium	2.30	2.3
Phosphorus	1.15	1.0

Other protein combinations suggested are:

	Starters		Developer
	(1)	(2)	(3)
Meat meal	8	7	6
Fish meal	11.5	9	5
Dried milk	5	2.5	—
Dried whey	—	2.5	—
Soybean oil meal	—	6	5
Oyster shell (additional)	—	0.5 to 1	—